

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A lithographic projection apparatus comprising:
a support structure constructed to support a patterning device, said patterning device ~~adapted~~ being configured to pattern a beam of radiation according to a desired pattern;
a substrate holder constructed to hold a substrate;
a projection system constructed and arranged to project the patterned beam onto a target portion of the substrate; and
a downstream radical source having a tube connected to a gas supply and configured to provide a beam of radicals directed onto a surface of a component to be cleaned,
wherein the radicals are generated within a flow of gas from the gas supply in the tube, and
wherein the tube of the radical source is constructed and arranged to be moved relative to the surface to be cleaned and/or the component is constructed and arranged to be moved relative to the tube of the radical source so that the beam of radicals is incident on the surface to be cleaned.
2. (Original) A lithographic projection apparatus according to claim 1, wherein said beam of radicals contains substantially no ionized particles.
3. (Previously Presented) A lithographic projection apparatus according to claim 1, wherein said gas supply supplies at least one of oxygen, hydrogen, or fluorine.
4. (Previously Presented) A lithographic projection apparatus according to claim 3, wherein said downstream radial source provides a beam of at least one of oxygen radicals, hydrogen radicals, or fluorine radicals.

5. (Previously Presented) A lithographic projection apparatus according to claim 1, wherein said surface of the component to be cleaned is on one of the patterning device, a sensor, a lens, a deflector, or a beam reflector.

6. (Original) A lithographic projection apparatus according to claim 1, wherein the position of the downstream radical source is fixed.

7. (Previously Presented) A lithographic projection apparatus according to claim 6, further comprising a structure to direct said beam of radicals onto said surface to be cleaned, said structure comprising a device that moves the component containing said surface such that the beam of radicals is incident on said surface.

8. (Previously Presented) A lithographic projection apparatus according to claim 1, wherein the downstream radical source comprises one or more of an RF coil, a pair of DC discharge electrodes, a microwave cavity, and an RF cavity that generates a region of plasma within the flow of gas from the gas supply, the radicals being created in said plasma region.

9. (Previously Presented) A lithographic projection apparatus according to claim 1, wherein the downstream radical source comprises a high temperature element located within the flow of the gas from the gas supply, the temperature of the high temperature element being sufficient to cause thermal dissociation to create the radicals.

10. (Previously Presented) A lithographic projection apparatus according to claim 1, further comprising:

an evacuated chamber that contains the patterning device, the substrate, and the projection system,

wherein the beam of radicals are discharged from an end of said tube, and said end of the tube is located in the evacuated chamber.

11. (Original) A lithographic projection apparatus according to claim 10, wherein the region of the downstream radical source in which the radicals are formed is located outside of the evacuated chamber.

12. (Original) A lithographic projection apparatus according to claim 1, wherein the apparatus comprises at least two downstream radical sources and corresponding beams of radicals for cleaning said surface.

13. (Previously Presented) A lithographic projection apparatus according to claim 1, wherein said surface of the component to be cleaned comprises a surface of an optical element.

14. (Previously Presented) A device manufacturing method comprising:
providing a beam of radiation;
patterning the beam of radiation;
projecting the patterned beam of radiation onto a target portion of a layer of radiation-sensitive material;
providing a flow of gas from a gas supply;
generating a beam of radicals in the flow of gas from the gas supply in a tube of a downstream radical source;
moving the tube of the radical source relative to a component comprising a surface to be cleaned and/or moving the component relative to the tube of the radical source; and
directing said beam of radicals onto the surface to be cleaned so that the beam of radicals is incident on the surface to be cleaned.

15. (Currently Amended) A lithographic projection apparatus comprising:
a radiation source that provides a beam of radiation;
a support structure constructed to support a patterning device, said patterning device adapted being configured to pattern the beam of radiation according to a desired pattern;
a substrate holder constructed to hold a substrate;

a projection system constructed and arranged to project the patterned beam onto a target portion of the substrate;

a radical source connected to a gas supply and configured to generate a localized beam of radicals in a flow of gas from the gas supply in a tube of the radical source; and

a structure to direct said beam of radicals onto a surface to be cleaned,

wherein said radical source is disposed away from said radiation source such that operating conditions of said radical source do not adversely affect said beam of radiation, and

wherein the tube of the radical source is constructed and arranged to be moved relative to a component comprising the surface to be cleaned and/or the component is constructed and arranged to be moved relative to the tube of the radical source so that the localized beam of radicals is incident on the surface to be cleaned.

16. (Previously Presented) A lithographic projection apparatus according to claim 15, wherein said radical source comprises:

a plasma generator to generate a plasma region,

wherein gas from the gas supply flows through the tube and through the plasma region such that neutral and ionized particles are created, and

the beam of radicals exits the tube at an orifice onto the surface to be cleaned.

17. (Original) A lithographic projection apparatus according to claim 16, wherein walls of the tube neutralize the ionized particles.

18. (Original) A lithographic projection apparatus according to claim 16, wherein a Faraday grid neutralizes the ionized particles.

19. (Original) A lithographic apparatus according to claim 18, wherein the Faraday grid is disposed at the orifice of the tube.

20. (Previously Presented) A lithographic apparatus according to claim 15, wherein said surface to be cleaned comprises a surface of an optical element.